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¶1. (U) Introduction: This is the second of a four-part cable dealing with coal and the important role coal plays in the South African economy. Part 2 provides an in-depth look at the South African coal industry, from coalfields to production, uses and exports. It also looks at the infrastructure available and the legislation governing the industry, including the requirements of black economic empowerment legislation. Reftel contains a summary for all four parts. End Introduction.

The South Africa Energy Scene

¶2. (U) South Africa's primary energy mix is 68% coal, 18% oil, 9% biomass, 3% gas, 1% hydro and 1% nuclear. The 18% oil component includes 4% synfuels derived from coal conversion and is made up of 65% imported crude and 35% locally produced oil. South Africa's daily oil production is about 35,000 barrels of crude from three small off-shore oil fields; 155,000 barrels of crude equivalent from Sasol's two coal-to-liquid (CTL) plants; and 45,000 barrels of crude equivalent from State-owned PetroSA's gas-to-liquid (GTL) plant. South Africa imports some 430,000 barrels per day crude at an annual cost of about $10 billion. In 2005, domestic oil production saved the country nearly $4.7 billion in foreign exchange.

¶3. (U) Sasol's CTL process consumes about 43 million tons of coal per year, produced mainly from its own four mines, plus purchases from other collieries as required. PetroSA derives natural gas for its GTL plant from small gasfields off the south Cape coast. These are expected to reach end of life by about ¶2012. A major search is underway to replace this supply either by discovering more gas, importing liquid natural gas (LNG), or relocating the plant to the west coast where two offshore gas fields may be producing by 2012. The Sasol and PetroSA coal and gas conversion plants are the largest of their kind in the world.

¶4. (U) Eskom generates 95% of South Africa's electricity and the remaining 5% is generated by municipalities. During 2005, 92% of Eskom's output of 273,000 GWh was from 10 coal-fired plants with a net maximum capacity of 32,680 MW.
(Note: A MW equals 1 million watts of electricity and a GW equals 1 billion watts. Gigawatt-hours (GWh) are obtained by multiplying the generating capacity (MW) by the operating hours. For example, if the average capacity of a generating plant is 10 MW and it operates continuously for a year or 8760 hours, it will deliver a total of 87,600 MWh or 87.6 GWh. End Note.)

¶5. (U) Three others coal-fired plants with a total capacity of 3,540 MW will be returned to production by 2008. Apart from these base-load stations Eskom also operates a 1,800 MW pressurized water reactor (PWR) nuclear station at Koeberg in the Western Cape. Peaking and emergency supply is provided by two pump-storage stations totaling 1,400 MW and located in the Western Cape and KwaZulu/Natal, two gas turbine stations totaling 342 MW are in the Western and Eastern Cape provinces, and six small hydroelectric stations totaling 660 MW are located in various parts of the country.

¶6. (U) Over the past decade, mainly due to the SAG's now defunct energy privatization program, there has been an under-investment in new generation and transmission capacity. This became painfully apparent early in 2006 when an accident to Koeberg's Unit 1 generator caused the nuclear station to go off-line. The Western Cape suffered months of unplanned and (later) scheduled power outages due to a combination of insufficient generation and transmission capacity in and from Mpumalanga power plants. The SAG has allocated some $15 billion to be spent over the next five years to boost the whole electricity system. This includes expanding generation capacity by some 8,000 MW - 6,000 MW from refurbished and new coal-fired plants and 2,000 MW from gas/diesel-fired open cycle turbine plants. Nevertheless, reserve generating capacity is likely to remain below 10% of usable capacity for the foreseeable future, less than the industry-recommended reserve of 15%.

South African Coal Industry

¶7. (U) Coal was first mined in the early 1890's to provide domestic and industrial heat and steam (and later electricity) to power the country's expanding diamond and gold mines. By 2005, domestic coal sales amounted to 175 million tons of which 112 million tons were supplied to Eskom for generating electricity, 43 million tons to Sasol for conversion to liquid fuels and chemical products, and 20 million tons for local use in the chemical, cement, metallurgical and steel industries and

for domestic heating and cooking. An additional 71 million tons were exported, of which 77% went to Europe. Eskom's coal-fired plants generated 92% of the country's electricity. This represented 66% of the continent's total electricity supply and six to seven times Nigeria's total output with a population three times that of South Africa. Sasol Synfuels produced about 25% of the country's total fuel needs.

¶8. (U) The future of South Africa's international coal trade depends on a number of external factors including coal, oil and gas prices; concerns about energy security; competition from other energy sources and coal producers; and the ability to radically reduce emissions and capture and permanently store CO2 gas at relatively low cost. South Africa is investigating a number of options and alliances to develop and implement clean coal technologies.

¶9. (U) In 2005, five major and some 40 small coal companies produced 306 million tons of run-of-mine (ROM) coal from about 64 mines - 55% from underground operations. Over twenty of the smaller coal companies were created under Black Economic Empowerment (BEE) legislation and one is a black-owned and operated mine. The 245 million tons of saleable coal produced included 1-2 million tons of anthracite, coking and metallurgical coals, the rest being steam coal. Output came from Anglo Coal (23%), Ingwe (BHP-Billiton) (22%), Sasol (20%), Eyesizwe/Kumba merger (18%), Xstrata (8%), and small and BEE operators (9% total).

Coal Research

¶10. (U) For two to three decades prior to 2000, industry-supported research on the fundamental properties of coal was generally neglected. Given the size and importance of the coal industry, government-supported and university research

facilities were and still are inadequate and few coal scientists were or are being trained. Major users Sasol, Kumba and Eskom funded research to improve quality and efficiency of usage while competitive research on applications was carried out in-house or in overseas laboratories by major producers Kumba, BHP-Billiton and Anglo Coal.

¶11. (U) Over the past decade, growing global demand for steam coal, coal's increasing importance to the South African economy, and concerns about shrinking reserves of quality coal in producing coal fields, galvanized the industry into establishing the Coaltech Research program. The program formally commenced in 1999 as an initiative to develop technology and apply research findings that would enable the South African coal industry to remain competitive, sustainable and safe, well into the 21st century. Coaltech was established as a joint venture and equally funded agreement between Eskom, Anglo Coal, Ingwe Coal, Kumba Resources, Xstrata Coal, Sasol Mining, Eyesizwe Coal, Total Coal, the Chamber of Mines, and the CSIR (the government-owned Council for Scientific and Industrial Research). A conditional grant was also provided by the Department of Science and Technology through the Enhanced Technology Development Program.

¶12. (U) In terms of the agreement, the program is directed by the Coaltech Management Team (CMT) composed of representatives from the above companies. In addition the Universities of the Pretoria and the Witwatersrand, the Department of Minerals and Energy, and the National Union of Mineworkers are represented on the CTM by invitation. Work done to date has extended the life of the Highveld and Witbank coalfields by more than five years. It has also resolved problems experienced with polluted water and fine coal discards, amongst others.

South Africa's Coal Resources

¶13. (U) South Africa has 18 principal coalfields spread over an area of some 700 km from north to south and 500 km from east to west. The coals are generally high in ash and low in reactive constituents and have a low sulfur level of (generally) less than 1%. Nine coalfields host operating mines that produce predominantly thermal coals. The remaining fields are deep, of poor quality, may contain undesirable radioactive and trace elements, and are unlikely to be developed in the near future. However, some contain coking coals and Rio Tinto is currently evaluating the Limpopo field in the north for this potential. There is no commercial production of coal-bed methane (CBM) but Sasol and Anglo American are investigating this potential.

¶14. (U) South Africa's estimated hard coal resource base exceeds 120 billion tons of which some 31 billion tons are considered to

be reserves. (Note: Reserves are that portion of a deposit or resource base that are economically recoverable under present economic and technical conditions. End Note.) The vast majority of this is steam coal, the remainder being anthracite and minor reserves of metallurgical and coking coal. In 2005, South Africa ranked fifth in production, and sixth in total reserves. However, because many countries do not comply with the reserve estimation standards used in South Africa, Canada and Australia, this ranking could change in the future.

¶15. (U) The Waterberg field in the north-west, hosts one mega-mine that produces 17 million tons of coal annually, of which 14.7 million tons feeds the giant, dry-cooled, Matimba power plant (3,690 MW). Matimba is the largest dry-cool plant in the world. Officially the Waterberg contains 10% of South Africa's coal reserves but is estimated to host about 50% of the total resource base. The field extends westwards into Botswana where plans are being formulated to produce power for export to South Africa. Coal reserves by field in billions of tons are:

Coalfield	Reserves	%Total
Highveld	9.8	32

Witbank	9.4	31
Ermelo	4.4	14
Waterberg	3.1	10
Vereeniging/Sasolburg	1.8	6
South Rand	0.7	2
Soutspansberg	0.3	